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Confirmation No.: 4549

Application No.: 10/633,439

Title: METHOD AND APPARATUS FOR PRODUCTION OF A CAST COMPONENT

Inventor: Donald J. Frasier

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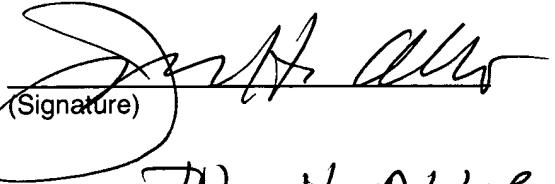
Attorney Docket No: RORO-225

Examiner: Tran, Len

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} Donald J. Frasier
(Printed Name)

APPEAL BRIEF

Mail Stop Appeal Brief - Patents
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P.O. Box 1450
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Sir:

Pursuant to the Notice of Appeal filed with the United States Patent Office on April 17, 2006 in connection with the above-indicated application, an Appeal Brief according to 37 CFR § 41.37 is provided. Also enclosed herewith is a Petition to Request a Five (5) Month Extension of Time to and including November 17, 2006, along

Appeal Brief
Application No. 10/633,439
Page 1 of 29
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with a credit card authorization form for the requisite fee under 37 CFR § 41.20 (b)(2) and 37 CFR § 1.17(a)(3). The Commissioner is authorized to grant any further extensions of time, and charge any deficiency or credit any overpayment to Deposit Account No. 12-2424, but not to include issue fees.

I. REAL PARTY IN INTEREST

Per 37 CFR §41.37(c)(1)(i), the real party in interest is Rolls Royce Corporation, the assignee of record, which is a subsidiary of Rolls-Royce PLC.

II. RELATED APPEALS AND INTERFERENCES

Per 37 CFR § 41.37(c)(1)(ii), the applicants, the applicants' legal representative, and the assignee wish to make the U.S. Patent Office aware of another Notice of Appeal filed in Application No. 10/632,504. An appeal brief was submitted in the '504 Application on November 1, 2006. The applicants, the applicants' legal representative, and the assignee are unaware of any other related appeals or interferences which will affect, be directly affected by, or have a bearing on the Appeal Board's decision in the present appeal.

III. STATUS OF CLAIMS

Per 37 CFR §41.37(c)(1)(iii), the status of the claims is as follows. Claims 1-36, 50-62 and 81-169 have been cancelled. Claims 37-49 and 63-80 are pending. Claims 37-49 and 63-80 stand rejected, and are being appealed on the grounds further explained hereinafter. The claims are presented in the Claims Appendix in accordance with 37 CFR §41.37(c)(1)(viii).

IV. STATUS OF AMENDMENTS

Per 37 CFR §41.37(c)(1)(iv), no amendments have been filed subsequent to taking this Appeal.

V. SUMMARY OF CLAIMED SUBJECT MATTER

Per 37 CFR §41.37(c)(1)(v), the following summarization provides a concise explanation of the subject matter defined in each of the independent claims involved in the appeal. This summarization refers to pages 48-50 and 64-69 of the present application and the figure designations of the present application, and all page and line numbers refer to the corresponding text of the present application.

Independent claim 37 is directed to an apparatus for pouring a molten metal, an exemplary embodiment of which is illustrated in Fig. 52 and described on page 64 line 13 to page 66, line 4 of the present application. The apparatus includes a crucible 122 having a bottom wall member 701 with an aperture 700 formed therethrough. The apparatus further includes an upstanding first tube 257 positioned within crucible 122 having a first end located around the aperture 700 and coupled to the bottom wall member 701, another second end that is closed, and at least one entrance 252 allowing the passage of molten metal from the crucible 122 to the first tube 257. The apparatus further includes an upstanding second tube 256 located within the first tube 257 having one end coupled to the bottom wall member 701 and in fluid communication with the aperture 700, another end defining an inlet and a cavity adapted for receiving a volume

of molten metal, and a passageway 251 extending along the second tube for the passage of the molten metal from an entrance to the inlet.

Independent claim 63 is directed to an apparatus including a mechanical housing, a crucible adapted to receive a metal material therein, the crucible positioned within the housing, and a heater positioned adjacent the crucible for heating the crucible and melting the metal received within the crucible, an exemplary embodiment of which is illustrated in Figs. 33, 52, 53A, 53B, 53C, 53D and 53E, and described on page 48, line 16 to page 50, line 19, page 64 line 13 to page 66, line 4, and page 67, line 14 to page 69, line 6 of the present application. The apparatus includes a pressure controlled precision pour assembly 125 positioned within the crucible 122. The pour assembly 125 has an outer cavity with at least one entrance for the passage of melted metal material from the crucible 125 to the outer cavity and an exit for the passage of melted metal material to an inner metering cavity. The pour assembly has a first state wherein the inner metering cavity receives melted metal material from the outer cavity until the inner metering cavity is full and a second state wherein the flow of melted metal material to the inner cavity is stopped and the melted metal material within the inner metering cavity is discharged.

Independent claim 69 is directed to an apparatus for dispensing a molten metal, an exemplary embodiment of which is illustrated in Figs. 33, and 52a, and described on page 48, line 16 to page 50, line 19, and page 66, line 5 to page 67, line 13 of the present application. The apparatus includes a mechanical housing having a first chamber 117 with a first pressure and a second chamber 118 with a second pressure.

The apparatus includes a crucible 651 positioned within the first chamber 117 of the mechanical housing and adapted to receive a stock of unmelted metal material 137 therein. The apparatus includes a heater positioned adjacent the crucible 651 and adapted for heating the crucible and at least a portion of the unmelted metal material therein to a molten metal state, wherein the crucible holds the volume of molten metal melted by the heater therein. The apparatus includes a tube 653 having a first end and a second end with a flow communication passageway therebetween, the first end is positioned beneath a surface of the volume of molten metal within the crucible and a second end positioned in fluid communication with the second chamber and defining a discharge aperture. The apparatus includes a pressure differential device within the first chamber and acting on the volume of molten metal to increase the pressure thereof and cause molten metal to flow through the passageway and out of the second end, the pressure differential device is defined by at least a portion of the unmelted metal material 137. A further exemplary embodiment according to claim 69 is illustrated in Fig. 52 and described on page 64 line 13 to page 66, line 4 of the present application.

Independent claim 72 is directed to an apparatus for pouring a molten metal, an exemplary embodiment of which is illustrated in Figs. 33, and 52a, and described on page 48, line 16 to page 50, line 19, and page 66, line 5 to page 67, line 13 of the present application. The apparatus includes a mechanical housing 651 with a bottom wall member and an interior volume adapted to hold a molten metal. The apparatus includes a molten metal delivery member 653 having a first molten metal inlet end adapted to receive molten metal from below the surface of the molten metal within the

interior volume and a second molten metal outlet end with a passageway therebetween. At least a portion of the delivery member 653 is positioned within the mechanical housing 651. The passageway has a first passageway portion and a second passageway portion and a inflection portion 655 wherein the direction of molten metal flow changes. In a first discharge mode a first direction of molten metal flow within the first passageway portion is from the molten metal inlet to the inflection portion 655 and from the inflection portion 655 through the second passageway portion in a second direction to the outlet. A further exemplary embodiment according to claim 72 is illustrated in Fig. 52 and described on page 64 line 13 to page 66, line 4 of the present application.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Pursuant to 37 CFR §41.37(c)(1)(vi), review of the following issue is presented in this appeal: the rejection of claims 37-49 and 63-80 under 35 U.S.C. § 103(a) based upon U.S. Patent No. 5,335,611 to Paine (hereinafter “Paine”) in view of U.S. Patent No. 833,150 to Attenhofer (hereinafter “Attenhofer”).

VII. ARGUMENTS

The following remarks address the grounds of rejection in accordance with 37 CFR § 41.37(c)(1)(vii). The only rejection in the present application is of claims 37-49 and 63-80 as obvious under 35 U.S.C. § 103(a) based upon Paine in view of Attenhofer. The seminal case directed to application of 35 U.S.C. § 103 is *Graham v. John Deere*,

383 U.S. 1, 148 USPQ 459 (1966). From this case, four familiar factual inquiries have resulted. The first three are directed to the evaluation of prior art relative to the claims at issue, and the last is directed to evaluating evidence of secondary considerations.

See, MPEP §2141.

The examiner bears the burden of establishing a *prima facie* case of obviousness. See, *In re Warner*, 379 F.2d 1011, 1016, 154 USPQ 173 (CCPA 1967), *cert. denied*, 389 U.S. 1057 (1968). To meet this burden, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Third, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. See, MPEP § 2142, citing *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). For the following reasons, these criteria have not been met and a *prima facie* case of obviousness has not been established.

A. The Asserted Combination Fails to Create a *Prima Facie* Case of Obviousness Since it Changes the Basic Principle of Operation of Paine

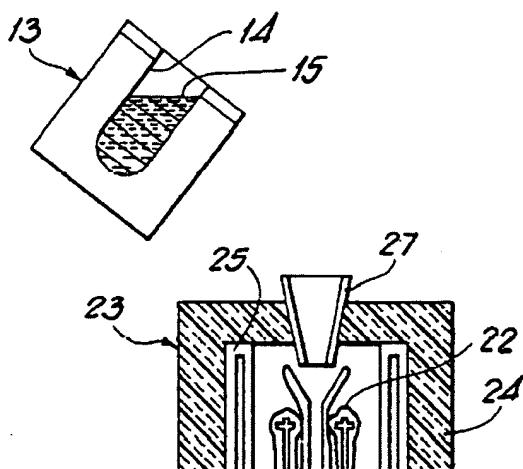
If a proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the

references are not sufficient to render the claims *prima facie* obvious. *See*, MPEP 2143.01, *citing In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959). *In re Ratti* reversed the rejection of claims directed to an oil seal comprising a bore engaging portion with outwardly biased resilient spring fingers inserted in a resilient sealing member. The primary reference relied upon in a rejection based on a combination of references disclosed an oil seal wherein the bore engaging portion was reinforced by a cylindrical sheet metal casing. The court reversed the rejection "since the suggested combination of references would require a substantial reconstruction and redesign of the elements shown in [the primary reference] as well as a change in the basic principle under which the [primary reference] construction was designed to operate." *In re Ratti*, 270 F.2d 810, 813, 123 USPQ 349, 352 (CCPA 1959), cited by MPEP 2143.01.

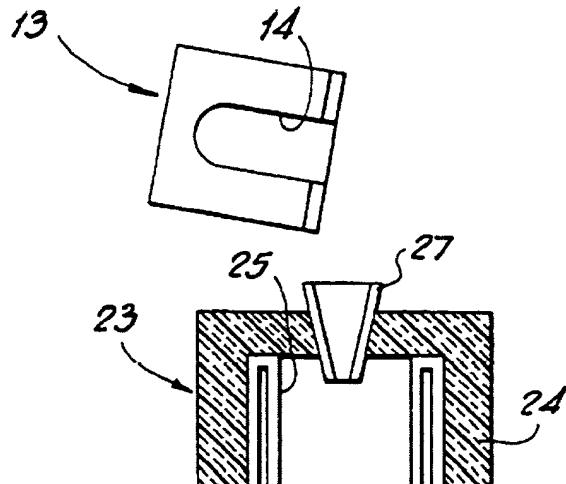
The examiner's rejection suffers from the same deficiency as the rejection in *In re Ratti*. The rejection proposes modifying the Paine reference "to provide a dispensing means as taught by Attenhofer ..." Final Office Action, page 3. This modification would require a substantial reconstruction and redesign of the Paine reference and would change Paine's basic principle of operation.

Paine discloses a system that pours molten metal using a conventional tilt pour crucible: "[c]ontained in the chamber 11 is a coil box assembly 13 having induction heating coils (not shown) and crucible 14; the assembly 13 being mounted such that it may be tilted to pour the molten metal 15 in known manner." *See*, Paine, column 5, lines 20-24 (underlining added); *also see* column 6, lines 64-66 ("Operation of the

apparatus [of Figs. 3 and 4] is essentially similar to that described with reference to FIGS. 1 and 2."). This principle of operation is illustrated in the following portions of Figs. 1 and 2 of Paine:



Portion of Fig. 1 of Paine



Portion of Fig. 2 of Paine

Assuming *arguendo* that the asserted combination of Attenhofer and Paine would even be operative, it would require a substantial redesign of Paine's crucible that would change its basic tilt-pour principle of operation. Attenhofer describes a rain water storage cistern A which has discharge pipe B that passes through its bottom and terminates a suitable distance from the top of the cistern. See, Attenhofer page 1, lines 9-11, and 54-63. Attenhofer does not disclose a tilt-pour system for discharging a molten metal. Rather, Attenhofer describes a system where water rises in a jacket C that surrounds a portion of the discharge pipe B until a stream of water flows into pipe B to produce a siphon which continues until the water level in the cistern reaches a fraction below a cap D. See, Attenhofer page 1, lines 63-106. Even if the water

siphoning system of Attenhofer could somehow be added to the crucible of Paine, this combination would require a substantial redesign of Paine that would change Paine's basic tilt pour principle of operation. For at least this reason, the asserted combination of Paine and Attenhofer fails to create a *prima facie* case of obviousness.

B. The Asserted Combination Fails to Create a *Prima Facie* Case of Obviousness Since Attenhofer Teaches That it Would Render Paine Unsatisfactory for its Intended Purpose

It is well established that, "an applicant may rebut a *prima facie* case of obviousness by showing that the prior art teaches away from the claimed invention in any material respect." *In re Peterson*, 315 F.3d 1325, 1331, 65 USPQ2d 1379 (Fed. Cir. 2003). Furthermore, if a proposed modification renders a reference being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. See, MPEP 2143.01, *citing In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984).

As stated above, the examiner's proposed combination is to add the discharge system of Attenhofer to Paine. See, Final Office Action, page 3. Attenhofer teaches that this combination would render Paine unsatisfactory for its intended purpose of metal casting. According to Attenhofer "any accumulation of sediment that may occur at the base of the jacket will be drawn up and carried out through the pipe B ..." See, Attenhofer page 1, lines 98-100. This contamination in the discharge of Attenhofer would render Paine unsatisfactory for metal casting since the contaminants would be introduced into the metal being cast which would result in defects.

Attenhofer's teachings cannot be avoided by the examiner's argument that the asserted combination "will eliminate impurities in the molten metal prior to introducing into the mold." See, Final Office Action, page 4. The Examiner's argument overlooks the fact that denser impurities would be present at the bottom of the molten metal and would be introduced into the mold by the proposed combination as explicitly stated by Attenhofer. Additionally, no argument about the casting arts can change Attenhofer's explicit teachings.

The examiner appears to have misunderstood Attenhofer teachings regarding the discharge of contaminants. The examiner mistakenly cites page 1, lines 12-33 of Attenhofer as teaching a discharge structure "for the purpose of eliminating any impurities in the water going to a cleaner source." See, Final Office Action, page 3. To the contrary, Attenhofer states "any accumulation of sediment that may occur at the base of the jacket will be drawn up and carried out through the pipe B ..." See, Attenhofer, page 1, lines 98-100. Furthermore, Attenhofer discloses only one discharge route from the cistern. Thus, the examiner's contention that Attenhofer somehow eliminates impurities from its discharge is physically impossible. Attenhofer teaches a single discharge which includes contaminants that will make it unsatisfactory for the very purpose that the examiner proposes it be used. Accordingly, the proposed combination of Paine and Attenhofer fails to establish a *prima facie* case of obviousness since Attenhofer teaches that it would render Paine unsatisfactory for its intended purpose.

C. The Examiner’s Rejection Is Based upon Impermissible Hindsight

The Federal Circuit has repeatedly admonished that “[o]ne cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention.” *In re Fritch*, 972 F.2d 1260, 1266, 23 USPQ2d 1780, 1784 (Fed. Cir. 1992), quoting *In re Fine*, 837 F.2d 1071, 1075, 5 USPQ2d 1596, 1600 (Fed. Cir. 1998). This analysis is forbidden because it would “discount the value of combining existing features or principles in a new way to achieve a new result—often the very definition of invention.” *Ruiz v. A.B. Chance Co.*, 357 F.3d 1270, 1275, 69 USPQ2d 1686 (Fed. Cir. 2004). The examiner has fallen into this forbidden analysis in rejecting the present application.

The examiner has not identified any suggestion, teaching or motivation to combine the tilt pour metal casting system of Paine with the discharge system of Attenhofer’s water storage cistern. The examiner does argue that the asserted combination “will eliminate impurities in the molten metal prior to introduction into the mold.” See, Final Office Action, page 4. Yet, as explained above in section VII.B, Attenhofer contradicts this argument by expressly stating that contaminants are carried through its discharge system. See, Attenhofer, page 1, lines 98-100. Thus, the rejection has been made without any motivation or suggestion for the asserted combination.

In an attempt to counter the hindsight problem, the examiner has cited *In re McLaughlin*, 443 F.2d 1392 170 USPQ 209 (CCPA 1971). This authority stands only for the proposition that rejections are proper when they are based only on the knowledge

which was within the level of ordinary skill in the art, and do not include knowledge gleaned from the applications disclosure. In the present application, the examiner has not offered any knowledge of those skilled in the art to support the combination of Paine and Attenhofer other than an argument that is contradicted by the very references the examiner seeks to combine. Thus, the examiner cannot rely upon such knowledge to insulate the present rejection from impermissible hindsight.

There are multiple indications that the present rejection is based upon impermissible hindsight. The proposed combination involves selectively taking particular pieces from a reference concerned with a cistern for rainwater storage, and adding them to a tilt pour crucible associated with the casting of molten metal. This unusual combination would change the manner of operation of the primary reference. Furthermore, reviewing these prior references teaches one skilled in the art that the asserted combination would be unsatisfactory for its intended purpose. These indicia point to the conclusion that the examiner has engaged in impermissible picking and choosing of isolated elements found in prior art references while using the present application as a template for assembling them. For this reason no *prima facie* case of obviousness has been established.

D. The Attenhofer Reference Is Nonanalogous Art That Cannot Serve As the Basis for An Obviousness Rejection

As the examiner has acknowledged, “a prior art reference must either be in the field of applicants endeavor or, if not, then be reasonably pertinent to the particular problem with which the inventor was concerned in order to be relied upon as a basis

for rejection of the claimed invention." Final Office Action, page 4, *citing In re Oetiker*, 977 F.2d 1443, 1446, 24 USPQ2d 1443, 1445 (Fed. Cir. 1992). Attenhofer "relates to cisterns and tanks, and is designed more particularly for receiving and storing rain water." Attenhofer, page 1, lines 9-11. The present application relates to the pouring of molten metals. Attenhofer is not in the field of applicant's endeavor and the examiner does not even contend that it is.

It must also be considered whether Attenhofer is reasonably pertinent to the particular problem of the present application. The standard for making this determination is:

A reference is reasonably pertinent if, even though it may be in a different field from that of the inventor's endeavor, it is one which, because of the matter with which it deals, logically would have commended itself to an inventor's attention in considering his problem. Thus, the purpose of the both the invention and the prior art are important in determining whether the reference is reasonably pertinent to the problem the invention attempts to solve. If a reference disclosure has the same purpose as the claimed invention, the reference relates to the same problem, and that fact supports use of that reference in an obviousness rejection. An inventor may well have been motivated to consider the reference when making his invention. If it is directed to a different purpose, the inventor would accordingly have had less motivation or occasion to consider it.

In re Clay, 23 USPQ2d 1058, 1061 (Fed. Cir. 1992). Attenhofer does not deal with any problem having a logical connection to the present invention. As an initial matter, the examiner has misunderstood the purpose of Attenhofer. The examiner cites page 1, lines 12-33 of Attenhofer as describing "the purpose of eliminating any impurities in the water going to a cleaner source." See, Final Office Action, page 4. In fact, the cited

portion of Attenhofer describes two different purposes: permitting the discharge of water within a cistern that is supporting a layer of oil so that insects cannot gain access to the water without disturbing the oil, and discharging sediment and water at the bottom of the cistern through the same pipe. *See*, Attenhofer, page 1, lines 11-33 and Fig. 1. When the purposes of Attenhofer are correctly stated, it is apparent that they are not reasonably related to pouring molten metal. Supporting a layer of oil to exclude insects and removing sediment from the bottom of a cistern by discharging it with water at the bottom of the cistern, are problems so unrelated to pouring molten metal as to have essentially no logical relationship to the problem addressed by the present invention. Thus, Attenhofer is nonanalogous art that cannot be used as a basis for the present obviousness rejection.

E. The Asserted Combination of Paine and Attenhofer Does Not Teach or Suggest All the Limitations of Numerous Claims

As stated above, a *prima facie* case of obviousness requires that a proposed combination of references teach or suggest every claim limitation. The examiner's rejection fails to teach or suggest every element of multiple claims. The following groups of claims are presented for independent consideration.

- 1. The Proposed Combination Fails to Teach or Suggest The Claimed Nozzle Limitations**

Claim 38 recites “a nozzle in fluid communication with said aperture ...” Claim 39 recites “a nozzle coupled with said aperture and in fluid communication with said first cavity of the second tube ...” Claim 65 recites “a nozzle coupled to said crucible and in fluid communication with said discharge opening.” Neither Paine nor Attenhofer includes any teaching or suggestion of a nozzle, let alone a nozzle as recited in any of the foregoing claims. The Final Office Action does not even address the nozzle limitation of any claim. For at least these reasons, the asserted combination does not teach or suggest all the limitations of claims 38, 39, or 65 and the obviousness rejection of claim 38, 39, and 65 and claims 40-46, 48-49, and 66-69 which depend therefrom should be reversed.

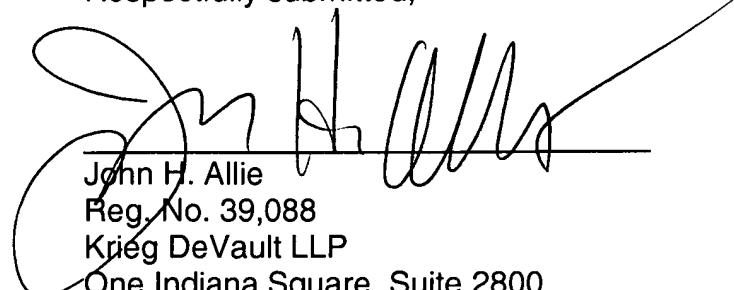
- 2. The Proposed Combination Fails to Teach or Suggest The Claimed Sensor Limitation**

Claim 48 recites “a sensor positioned proximate said outlet, said sensor detects an initial flow of molten metal from said outlet ...” Neither Paine nor Attenhofer includes any teaching or suggestion of a sensor, let alone a sensor as recited in claim 48. The Final Office Action does not even address the sensor limitation. For at least these reasons, the asserted combination does not teach or suggest all the limitations of claim 48 and the obviousness rejection of claim 48 should be reversed.

VIII. CONCLUSION

For the foregoing reasons, reversal of the rejection by the Appeal Board is hereby requested.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "John H. Allie", is written over a horizontal line. The line is intersected by several vertical and diagonal lines, creating a complex, abstract shape.

John H. Allie
Reg. No. 39,088
Krieg DeVault LLP
One Indiana Square, Suite 2800
Indianapolis, Indiana 46204-2079
Direct: (317) 238-6268
Fax: (317) 238-6371

EVIDENCE APPENDIX

[NONE]

CLAIMS APPENDIX

37. An apparatus for pouring a molten metal, comprising:

a crucible having a bottom wall member with an aperture formed therethrough;

an upstanding first tube positioned within said crucible and having a first end located around said aperture and coupled to said bottom wall member and another second end that is closed, said first tube having at least one entrance for allowing the passage of molten metal from said crucible to said first tube;

an upstanding second tube located within the first tube and having one end coupled to said bottom wall member and in fluid communication with said aperture and another end defining an inlet from said first tube, said second tube has a first cavity adapted for receiving a volume of molten metal therein; and

a passageway extending along said second tube for the passage of the molten metal from said at least one entrance to said inlet.

38. The apparatus of claim 37, which further includes a nozzle in fluid communication with said aperture, said nozzle adapted to deliver a substantially vertical stream of molten metal.

39. The apparatus of claim 37:

which further includes a nozzle coupled with said aperture and in fluid communication with said first cavity of the second tube, said nozzle has an inlet adapted to receive molten metal and an outlet adapted to discharge molten metal; and

which further includes a mechanical housing having a first chamber at a first pressure and a second chamber at a second pressure, and wherein said crucible is located within said first chamber and said outlet of the nozzle is located within said second chamber.

40. The apparatus of claim 39, which further includes pressure differential means for creating a pressure differential between said first chamber and said second chamber, wherein upon said pressure differential means causing said first pressure to be greater than said second pressure the molten metal within said crucible flows through said at least one entrance and into said passageway along said second tube.

41. The apparatus of claim 40, wherein said pressure differential means includes a supply of pressurized gas in fluid communication with said first chamber, and wherein said supply of pressurized gas is controlled to increase said first pressure in said first chamber.

42. The apparatus of claim 40, wherein said pressure differential means includes a quantity of unmelted metal stock extending into said first chamber, and

wherein said unmelted metal stock is advanced into the molten metal within said crucible to increase said first pressure.

43. The apparatus of claim 40, wherein said pressure differential means includes a vacuum in fluid communication with said second chamber, said vacuum being operable to reduce said second pressure.

44. The apparatus of claim 39, wherein a difference in size between said outlet and said at least one entrance allows the volumetric flow rate of molten metal through said at least one entrance to be substantially greater than the volumetric flow rate of molten metal through said outlet.

45. The apparatus of claim 44, wherein said at least one entrance defines a plurality of entrances.

46. The apparatus of claim 39, wherein said nozzle has an upstanding portion that extends into said second tube, and wherein a second cavity is defined between said second tube and said upstanding portion of said nozzle, wherein said second cavity is adapted to receive molten metal and heat said upstanding portion of said nozzle.

47. The apparatus of claim 37, wherein said first cavity defines a metering cavity holding a predetermined volume of molten metal.

48. The apparatus of claim 40, which further includes a sensor positioned proximate said outlet, said sensor detects an initial flow of molten metal from said outlet and communicates with said pressure differential means to stop creating a pressure differential between said first chamber and said second chamber.

49. The apparatus of claim 39, wherein said nozzle and said first tube and said second tube are parallel to one another, and wherein said at least one entrance is located adjacent said first end of the first tube.

63. An apparatus, comprising:
a mechanical housing
a crucible adapted to receive a metal material therein, said crucible positioned within said housing;
a heater positioned adjacent said crucible for heating the crucible and melting the metal received within said crucible; and
a pressure controlled precision pour assembly positioned within said crucible, said pour assembly has an outer cavity with at least one entrance for the passage of melted metal material from said crucible to said outer cavity and an exit for the passage of melted metal material to an inner metering cavity, and wherein said pour assembly

has a first state wherein said inner metering cavity receives melted metal material from said outer cavity until said inner metering cavity is full and a second state wherein the flow of melted metal material to said inner cavity is stopped and the melted metal material within said inner metering cavity is discharged.

64. The apparatus of claim 63, wherein said crucible includes a discharge opening, and wherein in said second state the melted metal material within said inner metering cavity flows through said discharge opening.

65. The apparatus of claim 64, which further includes a nozzle coupled to said crucible and in fluid communication with said discharge opening.

66. The apparatus of claim 65:
wherein said mechanical housing has a first chamber and a second chamber, and wherein said crucible is located within said first chamber; and
said second state discharges molten metal when the pressure in said second chamber is greater than the pressure within said first chamber.

67. The apparatus of claim 65:
wherein said crucible has a bottom wall member, and wherein said discharge opening is formed in said bottom wall member;

wherein said pressure controlled precision pour assembly includes an outer upstanding tube coupled to said bottom wall member and positioned around said discharge opening;

wherein said pressure controlled precision pour assembly includes an inner upstanding tube coupled to said bottom wall member and positioned around said discharge opening;

wherein said inner upstanding tube is positioned within said outer upstanding tube, and said outer cavity is located between said tubes, and wherein said inner metering cavity is positioned within said inner tube.

68. The apparatus of 67, wherein a difference in area between said nozzle outlet and said at least one entrance allows the volumetric flow rate of molten metal through said at least one entrance to be substantially greater than the volumetric flow rate of molten metal through said outlet.

69. An apparatus for dispensing a molten metal, comprising:
a mechanical housing having a first chamber with a first pressure and a second chamber with a second pressure;
a crucible positioned within said first chamber of the mechanical housing and adapted to receive a stock of unmelted metal material therein;

a heater positioned adjacent said crucible and adapted for heating the crucible and at least a portion of the unmelted metal material therein to a molten metal state, wherein said crucible holds the volume of molten metal melted by the heater therein;

a tube having a first end and a second end with a flow communication passageway therebetween, said first end positioned beneath a surface of the volume of molten metal within said crucible and a second end positioned in fluid communication with said second chamber and defining a discharge aperture; and

a pressure differential device within said first chamber and acting on the volume of molten metal to increase the pressure thereof and cause molten metal to flow through said passageway and out of said second end, said pressure differential device is defined by at least a portion of the unmelted metal material.

70. The apparatus of claim 69, wherein said pressure differential device defines a consumable member that is replenished by additional unmelted metal material.

71. The apparatus of claim 70, wherein said first chamber has an aperture therein adapted for the passage of the stock of unmelted metal material, and a substantially fluid tight seal is formed around the stock.

72. An apparatus for pouring a molten metal, comprising:

a mechanical housing with a bottom wall member and an interior volume adapted to hold a molten metal; and

a molten metal delivery member having a first molten metal inlet end adapted to receive molten metal from below the surface of the molten metal within the interior volume and a second molten metal outlet end with a passageway therebetween, at least a portion of said delivery member positioned within said mechanical housing, said passageway has a first passageway portion and a second passageway portion and a inflection portion wherein the direction of molten metal flow changes, in a first discharge mode a first direction of molten metal flow within said first passageway portion is from said molten metal inlet to said inflection portion and from said inflection portion through said second passageway portion in a second direction to said outlet.

73. The apparatus of claim 72, wherein said first passageway portion and said second passageway portion and said inflection portion define a substantially U shape.

74. The apparatus of claim 72, wherein said inflection portion is above the surface of the molten metal within said interior volume.

75. The apparatus of claim 74, wherein the pressure of the molten metal within the inflection portion is greater than the pressure at either of said molten metal inlet or said molten metal outlet.

76. The apparatus of claim 75, wherein said molten metal delivery member is integrally formed.

77. The apparatus of claim 72, wherein said second passageway portion defines a metering cavity.

78. The apparatus of claim 72, wherein the cross-sectional area of said passageway varies between said first inlet end and said second outlet end.

79. The apparatus of claim 78, wherein said first passageway portion tapers prior to said inflection portion.

80. The apparatus of claim 78, wherein said first passageway has a substantially frustum-conical shape part prior to said inflection portion.

RELATED PROCEEDINGS APPENDIX

While a related appeal was identified above in section II pursuant to 37 CFR § 41.37(c)(1)(ii), there are presently no decisions rendered by a court or the Board to include in this Appendix.